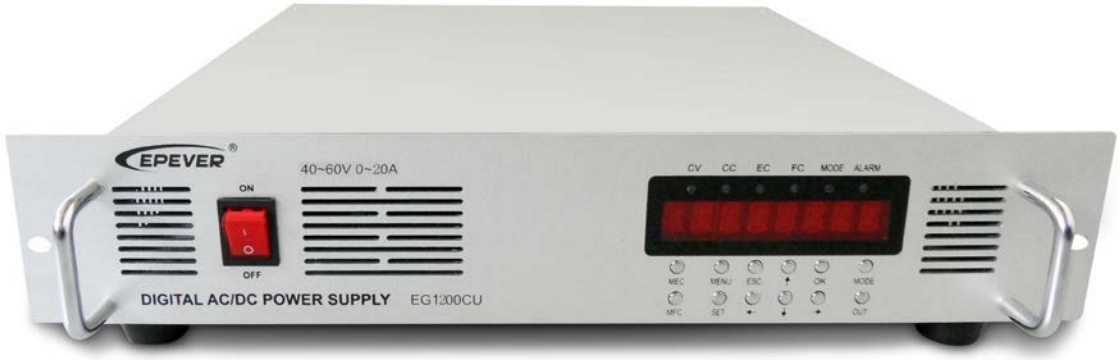
Digital AC/DC Power Supply

EG1200CU
40~60V 0~20A

USER MANUAL



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Chapter I ATTENTIONS

Thank you very much for selecting our product! This manual offers important information and suggestions with respect to installation, use and troubleshooting, etc. Please read this manual carefully before using the product and pay attention to the safety recommendations.

This manual contains important safety, function, installation and operating instructions for the digital power supply.

The following symbols are used throughout this manual to indicate potentially dangerous conditions or mark important safety instructions. Please take care of it when meeting these symbols.

CAUTION: Indicates a critical procedure for safe and proper operation of the digital power supply.

NOTE: Indicates a procedure or function that is important for the safe and correct operation for the digital power supply.

Safety Information

- ☞ Read all of the instructions and cautions carefully before installation.
- ☞ Reversing the load polarity is very easy to damage the equipment or come into the unpredictable dangers.
- ☞ Do not disassemble the product in order to avoid personal injury.

There is non-security voltage inside of the power supply. Please call the professionals in our company if you need repair.

- ☞ Do not install, replace parts or perform any unauthorized modifications on the instrument.
- ☞ Turn off the power before moving the working power supply.
- ☞ In order to avoid the risk of loose connection, please ensure that all connections are tight.
- ☞ Do not put heavy things on the power supply to avoid failures.

Chapter II OVERVIEW

EG1200CU--Digital switching power supply is a new generation of full digital isolate switching power supply which is designed with the technology of advanced active power factor correction and resonant soft-switching. The power supply has a wide range of AC input and an adjustable DC output. It has high power factor, high precision regulating, small size, high efficiency and other characteristics. The power supply is developed based on the industrial communication standard of YD/T731-2008 and realizes the full digital control based on the DSP (Digital Signal Processor) chip. Besides the power mode which can continuously output the constant-voltage or constant-current, it is also added the complete battery charging management mode. It can be used as the constant-voltage constant-current or battery charging power supply in order to meet the different applications.

The input port can be connected to mains or the output of oil-machine. The product can form a hybrid power system with the other products.

FEATURES

- The product adopts the advanced control algorithms and realizes the full digital control based on the DSP (Digital Signal Processor) chip.
- Using the isolated Hall components to assure the power supply a strong anti-interference ability.
- The power supply is suitable for the situation of volatile AC voltage

whose range from 176 to 265V.

- Output voltage can be adjusted continuously from 40 to 60V. The minimum adjustable voltage is 0.1V.
- Output current can be adjusted continuously from 0 to 20.5A. The minimum adjustable current is 0.1A.
- The output charging current can be set as constant according to the actual battery's AH.
- Without reducing rated power at the ambient temperature of 55℃.
- The power supply has a complete three-stages charging mode for bulk charge, equalizing charge and float charge.
- Multiple products with the same type can be connected in parallel or series and 'Hot-Swappable' application can be realized.
- HMI uses the LED to display rich content, the 2X6 matrix buttons to realize concise menu operation. It also has other functions such as buzzer, LED indication, alarm and so on.
- RS485 communication is realized via RJ45 isolated port and CAN communication is realized via the isolated port.
- Using a standard chassis with the 19 inches width and the 2U height.

Chapter III TECHNICAL SPECIFICATIONS

Table 3-1 EG1200CU technical parameters

Technical Index					
Parameter	**Test Condition**	**MIN**	**TYP**	**MAX**	**UNIT**
AC input voltage range		176	220	265	V
AC input frequency range		47.5	50	52.5	Hz
Power factor	Vin220V,Vout40V～60V/20A		0.97	0.98	
Surge	Vin220V,Vout60V/20A			10	A
Load regulation	Vin220V,Vout48V，0-20A			0.5	%
Power grid regulation	Vin187～242V,Vout48V/20A			0.1	%
Voltage-stabilizing accuracy	Vin187 ,Vout48V			0.6	%
Efficiency	Vin220V, Vout40V～60V/20A	89		91.4	%
Standby power	Vin220V			10	W
Setting Range					
Item	**Operation Tips**	**MIN**	**Default**	**MAX**	**Unit**
Output voltage in power mode	Continuous-adjustable; Accuracy is 0.1V	40	48	60	V
Equalize Voltage	Continuous-adjustable; Accuracy is 0.1V	40	57.6	60	V
Float Voltage	Continuous-adjustable; Accuracy is 0.1V	40	54.8	60	V
Output current (limitary-current)	Continuous-adjustable; Accuracy is 0.1A		20.5	20.5	A
Equalize Duration	Continuous-adjustable; Accuracy is one minute	30	120	180	MIN
Equalize Calendar	Continuous-adjustable; Accuracy is one day	10	30	90	DAY
Environment Pointer					
Item	**Condition**	**MIN**	**TYP**	**MAX**	**Unit**
Working humidity	Non-condensing			95	%
Working temperature	Output without derating at +55℃	-15		+55	℃
Storage temperature		-40		+85	℃
Safety Index					
Dielectric strength	AC-GND AC1500V one Minute			15	mA
	DC-GND AC500V one Minute			0.1	mA
	AC-DC AC3000V one Minute			1	mA
Structure Parameters					

Dimensions(H&W&L)	110（4. 3）X 483（19. 0）X 518（20. 4） mm(inches)
Output terminal	M6
Ground terminal	M5
Net weight(reference）	8.5Kg

Please set up the charging voltage and current according to the battery’s parameters!

Chapter IV OPERATION MODE

The product has two modes, one is power mode and the other is charging mode. The power mode has the character of constant-voltage constant-current and can be used as a conventional DC power supply. The charging mode has a perfect battery charging mechanism. Users can select the appropriate mode according to the actual application.

Section I Power Mode Introduction

Power mode has two output functions, one is constant-voltage and the other is constant-current. The DC output voltage can be set from 40 to 60V. The DC output current can be set from 0 to 20.5A. The output current is defined by the output voltage and the load resistance in power mode. The product outputs constant voltage and the green LED is lighted on solid, as long as the output current is lower than the limit current setpoint. If the load current is greater than the current setpoint, the device will be converted to constant-current mode and the red LED will be lighted on solid.

The output can be switched automatically between the mode of constant-voltage and constant-current according to comparing the current setpoint with load current. For example, the device in the constant-voltage mode will be converted to the constant-current mode automatically when the load current excesses the setpoint. In the same

way, the device in the constant-current mode will be converted to the constant-voltage mode automatically when the load voltage reaches at the output voltage setpoint.

The output voltage or current value can be set directly on real-time interface in power mode.

Section II Charging Mode Introduction

The charging voltage has two points in battery charging mode, one is equalize voltage and the other is float voltage. The equalizing charging mode has two parameters of Equalize Duration and Equalize Calendar. The equalize voltage, float voltage, Equalize Duration (duration after the stable of equalize charging point) and Equalize Calendar (period between the two equalize charging mode) all can be set. At the same time it can realizes the limitary-current charging by setting the output current.

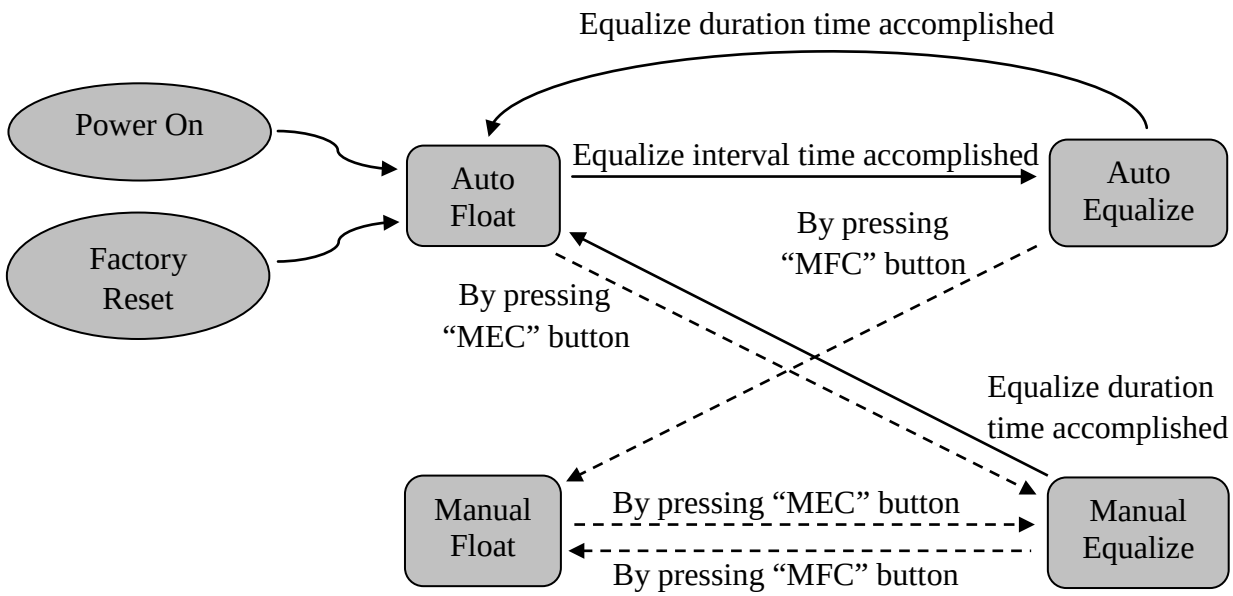
After each time of turning on the power, the device will be converted to automatic float charging mode, the Equalize Calendar will be start (the Equalize Calendar starts for the next cycle only after finishing the last Equalize Duration except for the first time of turn on the power). At this point, whether there is output or not, the device will be converted to the automatic float charging mode and the green LED will be lighted on solid when the Equalize Calendar is finished. When the device detects that the output voltage excess the value that is lower 0.5V than the equalize setpoint, the Equalize Duration will be start and will not be stopped until

it has been finished then the product will be converted to automatic float charge mode automatically and the yellow LED will be lighted on solid. The Equalize Duration will be paused until the condition is satisfied again if the voltage point is less than the value that is lower 0.5V than the equalize setpoint in half-way.

There are two buttons on the panel, one is forced equalize charge and the other is forced float charge. It will be converted to forced equalize charging mode and the green LED flashes when pressing the forced equalize charging button in float charging mode. The next cycle is automatic equalize charging mode when the Equalize Duration and Equalize Calendar are finished after enabling the forced equalize charging mode. The function is invalid when the power supply has been in equalize charging mode. It will be converted to forced float charging mode and the yellow LED flashes when pressing the forced float charging button in equalize charging mode. The function is invalid when the power supply has been in float charging mode. The device will keep in float charging mode after the forced float charging mode has been enabled.

The Equalize Calendar timer which has been started will be cleared (it starts once again until the Equalize Duration finished) when pressing the forced equalize charging button. The Equalize Duration which has been started without finishing will be paused when pressing the forced float charging button. It will not be cleared until the Equalize Calendar has

been finished in order to prevent the device to working in equalize charging mode for a long time during convert the mode repeatedly between forced float charging mode and forced equalize charging mode.



Attention： "——"means auto process; "-----" means manual process.

Figure 4-1 Charging Schematic Diagram

Section III Multi-machine Operation

- **Parallel Running**

Multiple same type power supplies can be connected in parallel, but the output voltage must be set at the same value. Turn on the power supply one by one. The load voltage is the same with each power supply and the load current is the sum of each power supply. The wiring diagram is shown below.

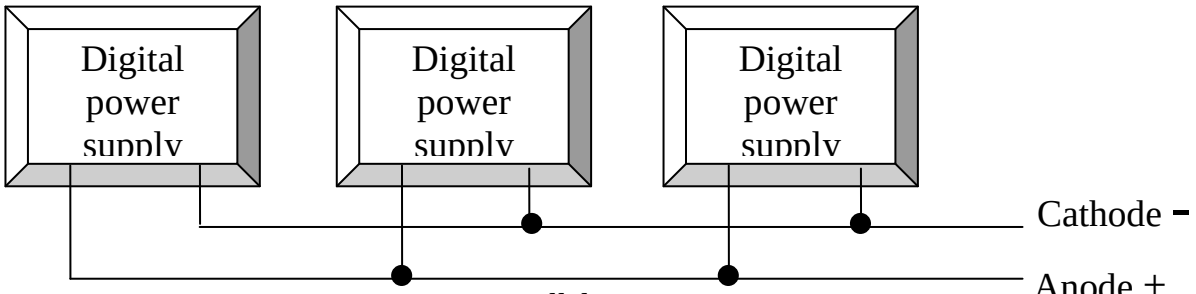


Figure 4-2 Parallel connection

- **Series Running**

Multiple same type equipments can be connected in series, but the current value of output should be set consistently. Turn on the power supply one by one. The load current is the same with each power supply and the voltage is the sum of each power supply. The wiring diagram is shown below.

Suggest: The output of each power supply should parallel a power resistance of 10k / 1w and a protection diode (pay attention to the technical parameters of the diode).

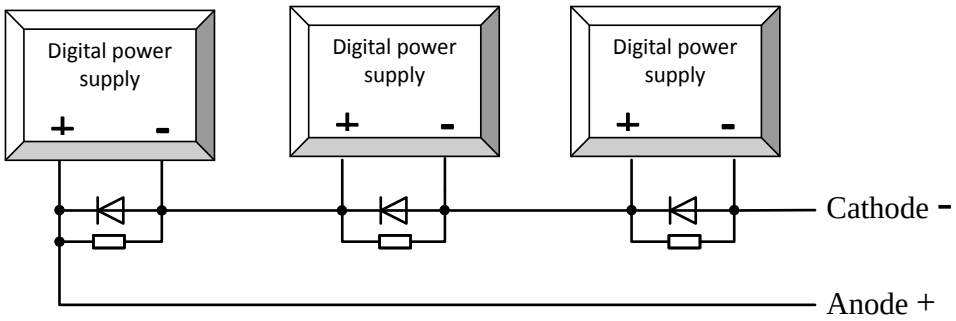


Figure 4-3 Series connection

Chapter V OPERATION INTERFACE

Section I Panel Shows

Front Panel:

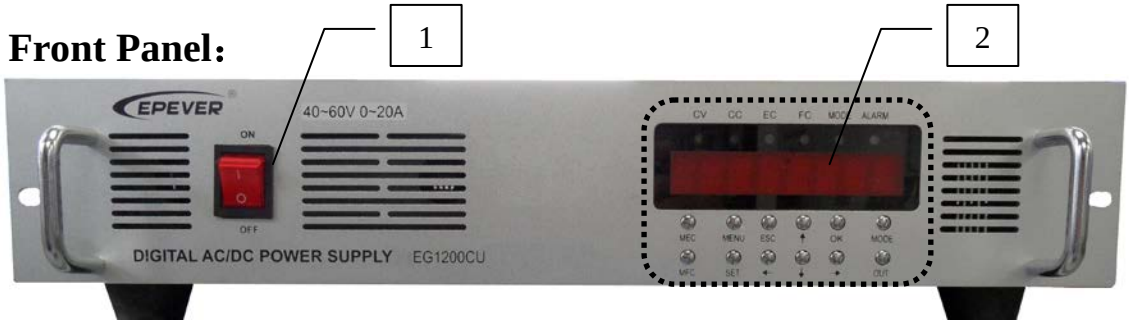


Figure 5-1 Front panel

Rear Panel:

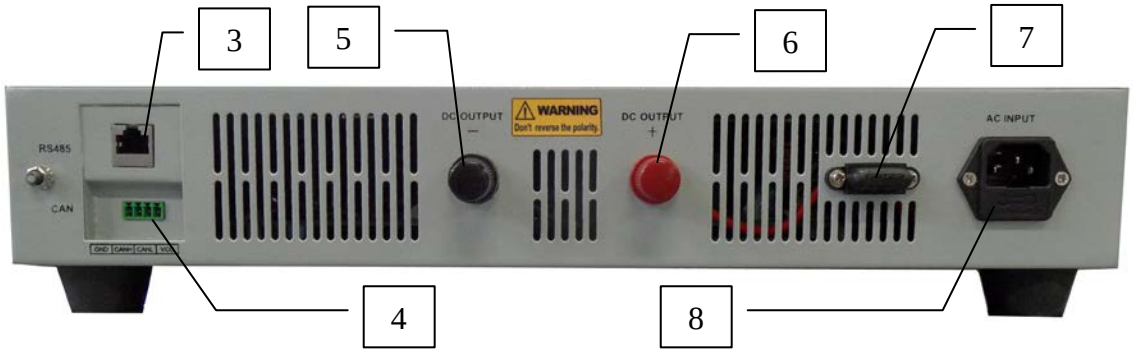


Figure 5-2 Rear panel

Illustrate:

① ON/OFF switch

② Human-machine interface

③ RS485 port

④ CAN bus port

⑤ DC output Negative terminal

⑥ DC output Positive terminal

⑦ DC output fuse

⑧ AC input socket with insurance

(**Note:** CAN bus port is reserved)

Section II Human-Machine Interface

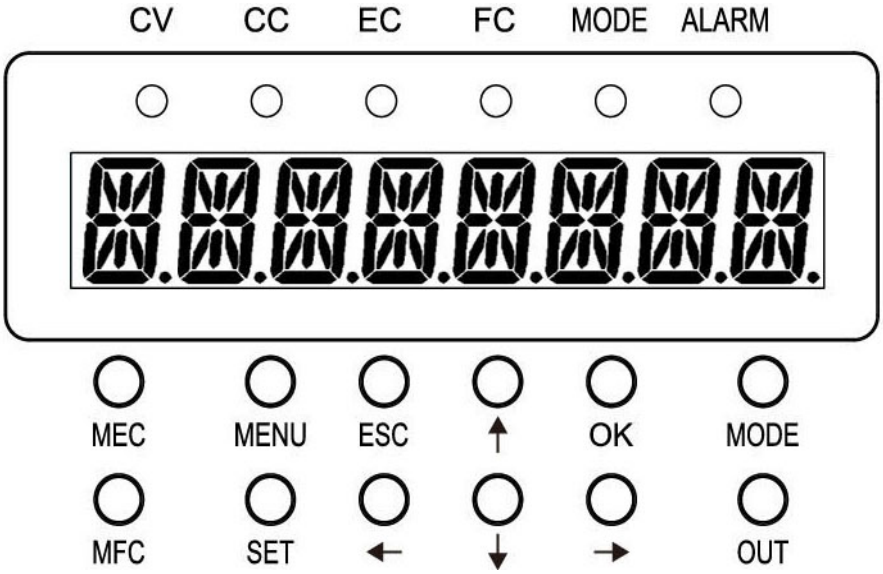


Figure 5-3 Human-machine interface

Table5-1 Interface specification

Items	Code	Color	Action	Function	Remark
LED indications	CV	Green	On solid	Constant-voltage output	
	CC	Red	On solid	Constant-current output	
	EC	Green	On solid	Automatic equalize charging mode	
		Green	Blink	Forced equalize charging mode	
	FC	Yellow	On solid	Automatic float charging mode	
		Yellow	Blink	Forced float charging mode	
	MODE	Green	Off	Power Mode	
		Green	On solid	Charging Mode	
	ALARM	Red and Green			Specific to see “Table 6-1 The state table of protection”
Soft-touch button	MEC			Forced equalize charging mode	Valid only in charging mode
	MFC			Forced float charging mode	Valid only in charging mode
	MENU			Menu switch	Switch between the interface of real-time,

					setting and failure.
	SET			Enter setting	Exit setting without saving if no operation within 60 seconds.
	ESC			Exit setting	
	OK			Confirm setting	
	↑↓			Change the setting value or the page of interface	
	←→			Move the cursor between the bits of the value or the page of interface	
	MODE			Switch between the power mode and charging mode	Display the last operation mode when turning on the power each time.
	OUT			Turn on or off the output	Turn the output on or off on any page except setting state
Alarm buzzer				The alarm of faults ; Button operation tips; Buzzing when pressing any button each time	
"*" tube				Display the parameters, failure tips and so on	

Interface description: The interface includes three parts, real-time, setting and failure. The page of failure does not exist when there is no failure. Each interface contains several pages to display the actual contents.

Press ↑ or ↓ button to flip page cyclically. Press ← or → button to jump to the first or last page of the interface.

The power mode or charging mode, real-time clock and day generating capacity will not be changed or cleared. They will maintain the current mode or parameters when restoring the factory settings.

When restoring the factory settings, the device will be converted to the automatic float charging mode. The Equalize Duration and the Equalize Calendar are cleared.

The last working mode and parameters will be selected when turning on the power supply.

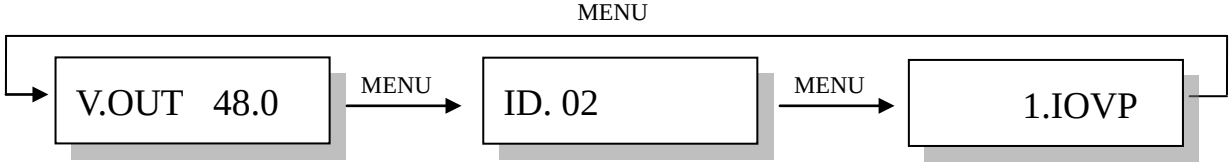
Section III Display Operation

- **Initialization**

EG1200CU

The device type is displayed firstly when turning on the power.

- **Power Mode**



The interface will be changed circularly between the interface of real-time, setting and failure when pressing MENU. Press ↑ or ↓ button to flip the page cyclically. Press ← or→ button to jump to the first or last page.

▼Real-time Interface — Output Voltage

V.OUT 48.0

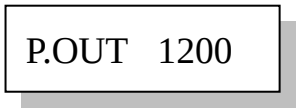
The interface of "Real-time Output Voltage" will be displayed if the initialization is normal. During setting , the first digit flashes when pressing SET,

the flashing bit will be moved right or left by pressing → or ←, the value will be added or subtracted by pressing ↑ or ↓. Press OK or ESC button to save the value or not. The current status will be maintained when setting up the device.

▼Real-time Interface — Output Current

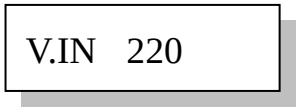
The output current value can be set directly in this page. The setting procedure is the same with the "output voltage". The device will not stop running when setting in both modes.

▼Real-time — Output Power



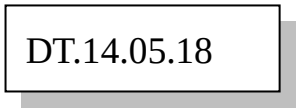
Real-time output power can't be set in both modes.

▼Real-time — Input Voltage



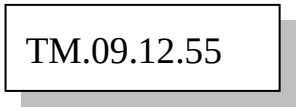
Real-time input voltage can't be set in both modes.

▼Real-time — Date



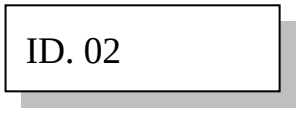
The real-time date value can be set in this page. The setting procedure is the same with the "output voltage" in both modes.

▼Real-time — Time



The real-time time value can be set in this page. The setting procedure is the same with the "output voltage". This page exists in both modes.

▼Set Interface — Device Address



The device's ID can be set in this page without

shutdown in both modes. The setting procedure is the same with the “output voltage”.

▼Set Interface —Series Rate

SBR 1152

The SBR can be set in this page without shutdown in both modes. The setting procedure is the same with the “output voltage”. Press ↑ or ↓ button to change the value.

▼Set Interface —Restore Factory settings

RSET YES

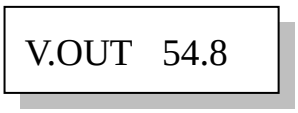
Restore factory settings. The setting procedure is the same with the “output voltage”. Press ↑ or ↓ button to change the value. The device will be shut down when saving the setting value.

Table 5-2 The parameters in power mode

Item	Code	MIN	Default	MAX	Unit	Remark
Output voltage	V.OUT	40.0	48.0	60.0	V	
Output current	C.OUT	0.0	20.5	20.5	A	
Real-time output power	P.OUT				W	Fixed
Real-time input voltage	V.IN				V	Fixed
Real-time date	DT				Y.M.D	
Real-time time	TM				H.M.S	
Device address	ID	0	2	180		
Serial port baud rate	SBR	9600	115200	115200	B	Press ↑ or ↓ button to change the value.
Restore factory settings	RSET	NO		YES		Press ↑ or ↓ button to change the value.
Failure interface	Fault codes in power mode：IOVP, ILVP, IOCP, OOVP, OLVP, OSCP, DOTP, BOVP, ONLP, CFAL					The largest figure represents the latest failure. The letters represent the failure code.

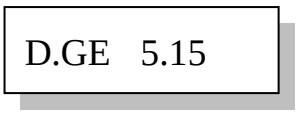
- **Charging mode**

▼Real-time Interface --Output Voltage



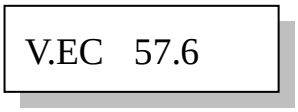
The page of real-time output voltage can't be set.

▼Real-time Interface --Generating Capacity of Day



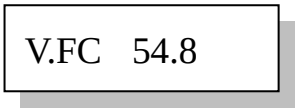
Power value flashes when pressing SET. Press OK or ESC button to clear the value or not.

▼Set Interface --Equalization Voltage



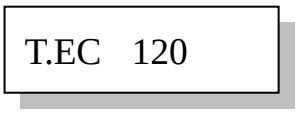
The value of equalize voltage can be set in this page without shutdown. The setting procedure is the same with the "output voltage".

▼Set Interface -- Floating Voltage



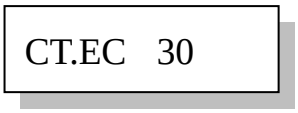
The value of float voltage can be set in this page without shutdown. The setting procedure is the same with the "output voltage".

▼Set Interface --Equalization Hold Time



The value of Equalize Duration can be set in this page. The setting procedure is the same with the "output voltage".

▼Set Interface --Equalization Cycle



The value of Equalize Calendar can be set in this page. The setting procedure is the same with the "output voltage".

Table 5-3 The parameters in charging mode

Item	Code	MIN	Default	MAX	Unit	Remark
Real-time charging voltage	V.OUT				V	Fixed
Output current	C.OUT	0.0	20.5	20.5	A	
Real-time output power	P.OUT				W	Fixed
Real-time input power	V.IN				V	Fixed
Generating capacity of day	D.GE				KWH	Manual reset; Automatic reset（when the real-time is zero hour）; Power on
Real-time date	DT				Y.M.D	
Real-time time	TM				H.M.S	
Equalize charging voltage	V.EC	40.0	57.6V	60.0	V	
Float charging voltage	V.FC	40.0	54.8V	60.0	V	
Equalize Duration	T.EC	30	120	180	MIN	
Equalize Calendar	CT.EC	10	30	90	DAY	
Device address	ID	0	2	180		
Serial port baud rate	SBR	9600	115200	115200	B	Press ↑ or ↓ button to change the value.
Restore factory settings	RSET	NO		YES		Press ↑ or ↓ button to change the value.
Failure interface	The code of failure in charging mode: IOVP, ILVP,IOCP, OOVP, OLVP, DOTP, BOVP, CFAL					The largest figure represents the latest failure. The letters represent the failure code

The failures and pressing any button of MODE OUT will stop the output, but the current charging status will not be affected.

The Equalize Duration will be paused when working in equalize charging mode and the Equalize Calendar without being affected when working in float charging mode.

Chapter VI PROTECTION FUNCTION

- **Input Under-voltage and Over-voltage Protection**

To prevent long-term work in the case of low voltage or high voltage which will shorten the life or damage the equipment when the grid fluctuates heavily. The device will be shut off when the over-voltage or under-voltage occurs. It will be recovered automatically when the grid voltage is normal.

- **Input Over-current Protection**

It will trigger input over-current protection when turning on the power or the input current is too large cased by abnormality.

- **Output Short-circuit Protection**

It will trigger short-circuit protection when the output short-circuit occurs. Power supply has a once-time self-recovery function of output short-circuit. The device will be shut off after one second when the load wirings are connected together. The system will be recovered automatically after 5 seconds for the first time. If the load is still short-circuit, the system will be shut off and no longer recovered automatically. If the system does not detect the short circuit fault once again after the first time within 1 minute, the system will reset the self-recovery function of output short circuit and repeat the above process。

- **Output Under-voltage and Over-voltage Protection**

The device has output over-voltage protection. It will be shut off automatically and the LED of the corresponding failure will be lighted when the output is over-voltage. It will trigger under-voltage protection when the output voltage is too low. The system will be shut off after 2 seconds. The remaining protections and self-recovery mechanism are consistent with the protection of output short-circuit.

- **Bus Over-voltage Protection**

It will trigger bus over-voltage protection to prevent the equipment being damaged when the input DC bus voltage is too large caused by abnormality.

- **No-load Protection in Power Mode**

It will trigger no-load protection to prevent the device working in no-load mode for a long time, save energy and extend the life when working in power mode.

- **Over-temperature Protection**

The device has over-temperature protection and self-recovery functions. The system is designed with sufficient margin in normal operating conditions. If the temperature of heat sink exceeds 95℃, the device will be shut off automatically and recovered below 75℃.

- **Communication Failure**

It will prompt users communication failure when there is a communication error between human-machine interface and internal control circuit. The device must be restarted immediately when the

communication failure occurs.

Table 6-1 The state table of protection

Item	Operation Value	Delay Time (S)	Recovery Values	ALARM Indicator Light	LED Indication	Buzzer
Input overvoltage protection	265±3V	2	250±3V	Red LED fast blink	IOVP	Intermittent buzzing
Input undervoltage protection	176±3V	2	190±3V	Red LED slow blink	ILVP	Intermittent buzzing
Input overcurrent protection	12.5A			Off	IOCP	Buzzing
Output overvoltage protection	94V			Green LED fast blink	OOVP	Buzzing
Output undervoltage protection	30V	2	Self-recovery	Green LED slow blink	OLVP	Buzzing
Output short circuit protection		1	Self-recovery	Orange LED blink	OSCP	Buzzing
Over temperature protection	95℃	5	75℃	Orange LED slow blink	DOTP	Intermittent buzzing
Bus overvoltage protection	475V	1		OFF	BOVP	Buzzing
No-load protection in Power Mode	0A	2		Red LED blink	ONLP	Buzzing
Communication failure				Orange LED fast blink	CFAL	Intermittent buzzing

The null items of "Recovery Value" which need to reapply in the table can’t be recovered automatically.

The green "ALARM " LED will be lighted on solid when there is no failure.

Pressing any button once can stop the beep of fault alarm then the button will recover the original function.

Chapter VII SIMPLE TROUBLESHOOTING GUIDE

Item	Failure	Possible Reasons	Simple Solution
1	HMI displays “IOVP”; Red LED fast blink; Intermittent buzzing; Output termination.	The input voltage is too high; The input voltage has a great fluctuation.	Measuring the input voltage is too high or not; Checking the value of input voltage is accurate or not; If the input is mains, it will be recovered automatically after mains has been recovered. If the input is oil-machine, it needs to be turned off. Then checking the state of the oil-machine.
2	HMI displays “ILVP”; Red LED slow blink; Intermittent buzzing; Output termination.	Input undervoltage; The input voltage has a great fluctuation.	Measuring the input voltage is too low or not; Checking the value of the input voltage is accurate or not; If the input is mains, it will be recovered automatically after mains has been recovered. If the input is oil-machine, it needs to be turned off. Then checking the state of the oil-machine.
3	HMI displays “OLVP”; Green LED slow blink; Always buzzing; Output termination.	Output undervoltage during work process; Load current exceed the current limitation set by the current set value.	Please make sure that the current exceeds the limitation and then increase it when connecting with a resistive load and so on. Checking the battery voltage is normal or not (Only 48V system). Make sure that the battery

			has been damaged or not and replace it in time when connecting with battery. The system has a recovery function and needs to be turned on again when exceeding the recovery time.
4	HMI displays “OSCP”, Red and Orange LED light on solid; Always buzzing; Output termination.	Output is short circuit when working; Output has short phenomenon.	Checking the output is short circuit or not. The system has a recovery function and needs to be turned on again when exceeding the recovery time.
5	HMI displays “DOTP”; Orange LED slow blink; Intermittent buzzing; Output termination.	Over temperature protection; Temperature of heat sink is too high.	The output will be recovered automatically as soon as the temperature becomes lower.
6	In Power Mode: HMI displays “ONLP”; Red LED is lighted on solid; Always buzzing; Output termination.	No load.	In Power Mode: The device will be shut off automatically after 2s when working in no load status. The device needs to be turned on again after troubleshooting.
7	HMI displays “CFAL”; Orange LED fast blink; Intermittent buzzing	Communication failures.	The device needs to be turned on again when communication failure occurs.

Chapter VIII MAINTENANCE PROCEDURE

The company is responsible for free repair within 18 months starting from the date of shipment to the original end use，if the device is used under the environment and rules prescribed in the manual.

- **Maintenance Procedure**

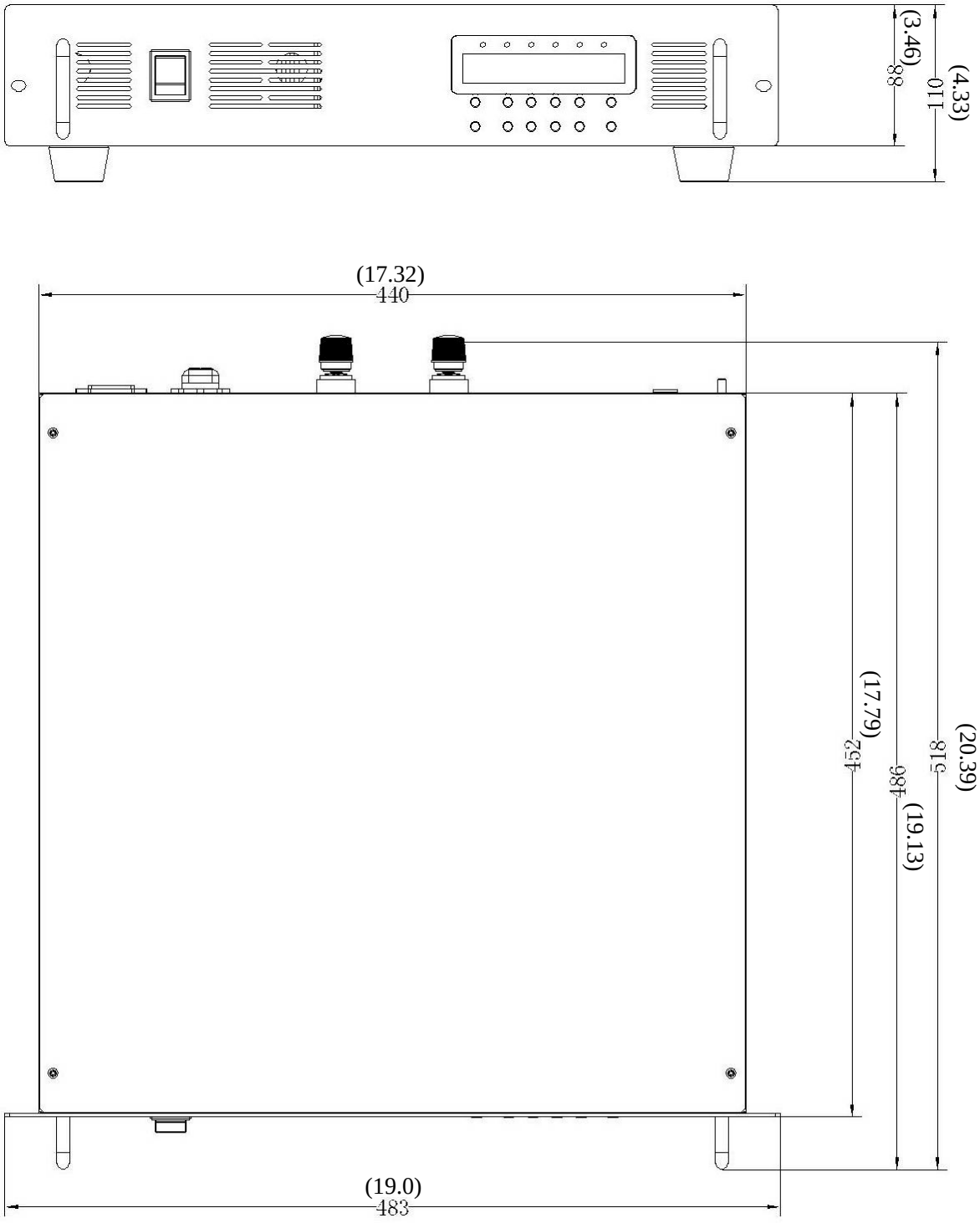
Before requesting warranty service, check the User Manual to be certain that there is a problem with the power supply. Return the defective product, the purchase invoice to us if problem cannot be solved. To obtain rapid service under this warranty, the returned products must include the product model, serial number and detailed reason for the failure, the operational parameters, type of batteries and system loads. This information is critical to a rapid disposition of your warranty claim.

- **This warranty does not apply under the following conditions**

1. Damage by accident, negligence, abuse or improper use.
2. Unauthorized product modification or attempted repair.
3. Damage during shipment.
4. Damage results from acts of nature such as lightning, weather extremes.
5. Irreclaimable mechanical damage.

Chapter IX OVERALL DIMENSIONS

Unit (inches)



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